Geophysical Research Abstracts
Vol. 21, EGU2019-14991, 2019
EGU General Assembly 2019

Influence of eastern boundary circulation variability on hydrography and biogeochemistry off Peru in early 2017

Jan Lüdke (1), David Clemens (1), Marcus Dengler (1), Gerd Krahmann (1), Stefan Sommer (1), Sören Thomsen (2), Martin Visbeck (1,3)

(1) GEOMAR Helmholtz Centre for Ocean Research Kiel, Physical Oceanography, Kiel, Germany (jluedke@geomar.de), (2) LOCEAN-IPSL, IRD/CNRS/Sorbonnes Universites (UPMC)/MNHN, UMR 7159, Paris, France, (3) Kiel University, Kiel, Germany

Dissolved oxygen (O_2) and nutrient concentrations at the continental margin of the eastern tropical south Pacific exhibit elevated intra-seasonal, seasonal and inter-annual variability. Here, we discuss the impact of intra-seasonal variability of the eastern boundary circulation at 12°S on the hydrography and biogeochemistry. Data from a multi-cruise physical and biogeochemical measurement program conducted between April and June (austral autumn) 2017 are used and compared to earlier cruises.

Upper ocean temperatures were anomalously high and from mid-April onwards the oxycline was displaced downward compared with previous observations in austral summer 2008/09 and 2012/13. We observed the offshore propagation of a newly generated eddy and an associated phase of weak poleward flow. After the reestablishing of the poleward Peru-Chile Undercurrent (PCUC) the passage of a downwelling coastal trapped wave caused an intensification of poleward velocities exceeding 50 cm/s. Warm temperature anomalies persisted during the intensified PCUC while sea surface temperature anomalies declined after the peak of the 2017 Coastal El Niño event in March. During the period of PCUC acceleration, nitrate concentrations increased while the phosphate concentrations were less affected, resulting in a drastically reduced nitrogen deficit. Because the temperature and salinity properties of the water remained unchanged the pathways of water supply are probably the same. Therefore the reduced nitrogen deficit was likely caused by shorter advection timescales in the intensified flow leaving the water less affected by anaerobic biogeochemistry.

We discuss the occurrence of such events and their implications for the biogeochemical element cycling in the water column and the sediments.